Phytologia (April 1993) 74(4):296-304.

THREE SPECIES OF *ASTER* (ASTERACEAE: ASTEREAE) DISJUNCT IN NORTHERN COAHUILA, MEXICO

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ABSTRACT

Three species of *Aster* are disjunct and apparently rare in northern Coahuila, México, each at a southern extension from the main part of its geographic range. *Aster laevis* is widespread in the United States but the Coahuilan plants belong to the same population system that continues northwestward in the Guadalupe Mountains of Texas, the White Mountains of New Mexico, and continuing north in the Rocky Mountains. The range of *A. oolentangiensis* continues northward beginning in east Texas; that of *A. drummondii* continues to the northeast beginning in the Edwards Plateau of Texas. The geographic ranges of these are mapped for Texas and Coahuila, and similar distribution patterns are noted for species of other families.

KEY WORDS: *Aster*, Asteraceae, Astereae, Coahuila, Texas, biogeography

Among plants collected in northern Coahuila by David H. Riskind in 1977 and recently accessioned into LL,TEX are two species of *Aster* that represent the first known collections from México of both. The taxonomic status of these two and one other earlier collection by L. Wynd and C. Mueller from the same area is subject to various interpretations and is discussed below. Each of the three species is disjunct southward from the main part of its geographic distribution, and the long distance of separation, the nonweedy tendencies of the species involved, the natural habitats of the plants in México, and similar geographic patterns found in other species suggest that the disjunctions are relictual rather than recent cases of dispersal.

1. *Aster laevis* L., *Sp. Pl.* 876. 1753.

Aster laevis L. var. *geyeri* A. Gray, *Synopt. Fl. N. Amer.* 1(2):183. 1884.

Aster laevis L. var. *guadalupensis* A.G. Jones, Sida 9:173. 1981. TYPE: UNITED STATES. Texas: Culberson Co., Guadalupe Mountains, mouth of McKittrick Canyon, along stream, 2 Jul 1958, *D.S. Correll & I.M. Johnston 19156* (HOLOTYPE: LL!).

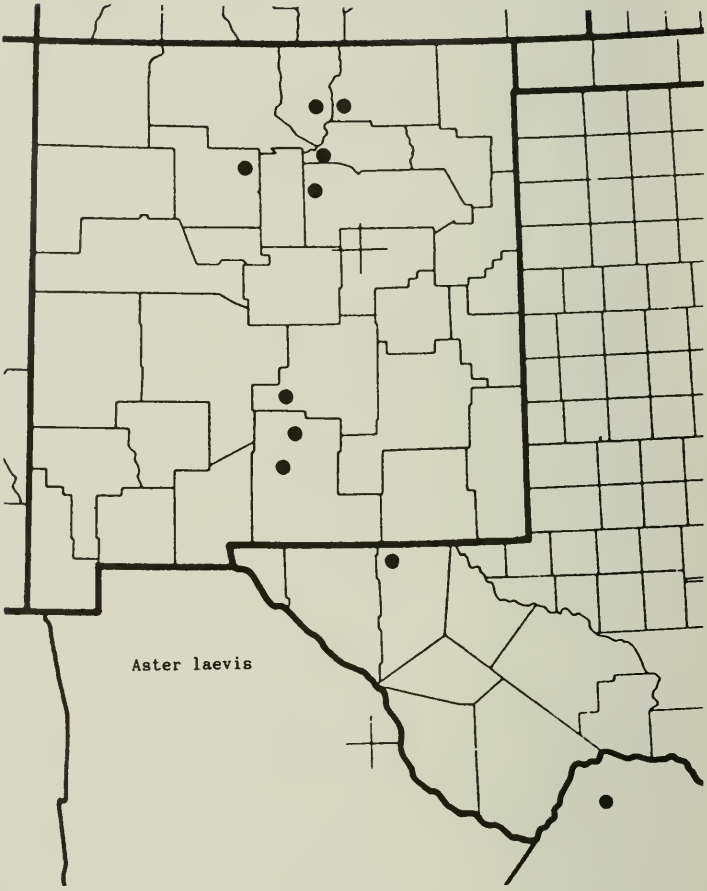
Aster subsalignus Rydb., Bull. Torrey Bot. Club 37:140. 1910. TYPE: UNITED STATES. Colorado: Garfield County, Glenwood Springs, 18 Aug 1906, *G.E. Osterhout 3397* (HOLOTYPE: NY!; Isotype: RM).

Aster laevis L. var. *strictiflorus* Osterhout, Muhlenbergia 6:47. 1910. TYPE: UNITED STATES. Colorado: Garfield County, Glenwood Springs, 18 Aug 1906, *G.E. Osterhout 3397* (HOLOTYPE: RM; Isotype: NY!).

Collections from MEXICO: Coahuila: Mpio. Villa Acuña, Serranias del Burro, Rancho El Bonito, ca. 29° 01′30″W, 102° 07′30″N: along logging road in Canyon El Bonito, ca. 11 km W of Rancho El Bonito headquarters, 1650 m, 17 Sep 1977, *Riskind 2101* (TEX); Canyon El Toro, intermittent drainage in limestone in a shaded slope with *Quercus muhlenbergii* and *Q. gravesii*, 18 Sep 1977, *Riskind 2145* (TEX) and *2157* (TEX); Canyon La Pantera, 19 Sep 1977, *Riskind 2232* (TEX).

Aster laevis is "an extremely variable species of wide distribution" (Jones 1980, p. 244) in the eastern United States and in the western U.S., where it occurs from the Dakotas to Oregon (and adjacent Canada) and southward along the Rocky Mountain cordillera into south central New Mexico and westernmost Texas. The specimens from Coahuila are identical to plants of *A. laevis* from the Guadalupe Mountains of Culberson Co., Texas, which were recently named as *A. laevis* var. *guadalupensis* (Jones 1981). There is a disjunction of more than 400 kilometers between the Coahuilan and Texan localities (Map 1), but the Guadalupe Mountains are essentially continuous with the White Mountains of Lincoln and Otero counties, New Mexico (also see Johnston 1979), where *A. laevis* apparently is more abundant and from where its range continues northward.

Jones (1981, pp. 172-173) characterized var. *guadalupensis* as having basal rosettes "strongly developed with several large, lanceolate, sessile or petiolate, glabrous and glaucous leaves still persistent when the plants are in flower (July through September). ...The cauline leaves in this variant are linear-lanceolate, abruptly reduced in size, the larger ones dilated at the clasping, sometimes auricled, base." In her key to three selected varieties of *A. laevis*, however, the only contrasts provided to distinguish var. *guadalupensis*



Map 1. Distribution of *Aster laevis* in Texas, México, and New Mexico; the range of the western North American segment of the species continues northward.

are "plants comparatively slender" (var. *guadalupensis*) vs. "plants typically stout" and "basal rosette leaves persistent at flowering time" (var. *guadalupensis*) vs. "basal rosette leaves withered at flowering time." I cannot find any consistently tangible features that correspond to "stout" and "comparatively slender," and the basal leaves of var. *guadalupensis* (in Culberson County) are conspicuously persistent only on the holotype. Persistent basal leaves can also be found on plants scattered through the entire range of the species.

Plants inseparable in morphology from *Aster laevis* in Texas and northern Coahuila are also abundant in Lincoln and Otero counties, New Mexico, and extend northward through New Mexico at least to the area of its border with Colorado (specimens in LL,TEX for San Miguel, Sandoval, Mora, and Colfax cos., New Mexico). These all have a tendency to produce cauline leaves that are relatively more widely spaced, stiffer, and more narrowly oblanceolate to narrowly elliptic lanceolate than those further north in the western United States as well as those in the eastern United States.

In northern New Mexico, southern Colorado, and the area somewhat northward, it may be possible to discern a trend toward slight widening of the leaves, but nearly linear leaved plants of *Aster laevis* continue to occur sporadically northward as far as Montana, Idaho, and Oregon. A collection of such from northwestern Colorado has been named as *A. laevis* var. *strictiflorus*, a name that can also be justifiably applied to the plants from Texas identified as var. *guadalupensis*. An even earlier name (*A. laevis* var. *simplex* Cockerell, West Amer. Sci. 6:10. 1889, the type from Colorado) may refer to the same plants. The western segment of *A. laevis* has generally been recognized as var. *geyeri*, and I am using this to refer to all of the western U.S. plants of the species until a more detailed study is available of variation within the whole species. Rydberg (1917) recognized four species now included as variants within *A. laevis*. Recent accounts of the flora of Colorado (Weber & Wittmann 1992) and New Mexico (Martin & Hutchins 1981), however, have recognized only var. *geyeri* from their respective areas. Var. *geyeri* has sometimes been observed (in floristic literature) to differ from var. *laevis* in producing smaller heads with less graduated involucral bracts, but even this may not be consistent.

It is significant to note that a trend toward production of narrow leaves also occurs in plants of *Aster laevis* in the eastern United States, where such have been formally recognized as *A. laevis* var. *concinnus* (Willd.) House (see Jones 1980). Cronquist (1980), however, maintained these as a separate species, *A. concinnus* Willd. Further, Cronquist included another eastern North American taxon, *A. purpuratus* Nees, as a synonym of *A. concinnus*, but Jones (1984) has maintained that the former represents yet another distinctive element within *A. laevis* (as var. *purpuratus* [Nees] A.G. Jones). The Coahuilan plants, however, are clearly connected with the cordilleran populations rather than those of eastern North America. In fact, except for the Culberson Co. population, *A. laevis* is not recorded from Texas. Numerous other varieties

and formas have been recognized within *A. laevis* on the basis of leaf shape, and it is clear that variation within the species needs to be studied before additional taxa are created or recognized.

Semple *et al.* (1989) reported the chromosome number of *Aster laevis* from the Guadalupe Mountains as n=24 and noted that the same number apparently invariably characterizes the species over its whole range (also see Jones 1980, Brouillet 1983, and Semple *et al.* 1992).

Examples of other species of northcentral México that, like *Aster laevis*, are distributed primarily northward through trans-Pecos Texas and into the Rocky Mountains and western North America are *Campanula rotundifolia* L., *Rhamnus betulaefolia* E. Greene, *Sisyrinchium demissum* E. Greene, and *Penstemon jamesii* Benth. *Potentilla propinqua* Rydb. appears to be long disjunct from the southern limit of its primary range in the New Mexico cordillera to near the northern end of the Sierra Madre Oriental east of Saltillo, Coahuila.

2. *Aster oolentangiensis* Riddell, West. J. Med. & Phys. Sci. 8:495. 1835.

Aster azureus Lindl. *in* Hook., Companion Bot. Mag. 1:98. 1835.

Aster vernalis Engelm. *ex* Burgess *in* Small, *Fl. Southeast. U.S.* 1215. 1903.

Aster poaceus Burgess in Small, *Fl. Southeast. U.S.* 1215. 1903. *Aster azureus* Lindl. var. *poaceus* (Burgess) Fern., Rhodora 51:95. 1949. *Aster oolentangiensis* Riddell var. *poaceus* (Burgess) A. Jones, Bull. Torrey Bot. Club 110:41. 1983.

Collections from MEXICO: Coahuila: Mpio. Villa Acuña, Serranias del Burro, Rancho El Bonito, ca. 29° 01′30″W, 102° 07′30″N: Canyon El Toro, intermittent drainage in limestone in a shaded slope with *Quercus muhlenbergii* and *Q. gravesii*, 18 Sep 1977, *Riskind 2125* (TEX) and *2135* (TEX); head of Canyon El Bonito on plateau of open pine-oak woodland, 2300 m, 20 Sep 1977, *Riskind 2266* (TEX).

Aster oolentangiensis is widely distributed in the central and eastern United States and into southern Ontario, Canada. The southern limit of its primary range is in Harris County of southeastern Texas (Map 2), where it is disjunct from the Mexican populations by a distance of more than 650 kilometers. The Coahuilan plants represent the form with narrow cauline leaves that has been recognized as var. *poaceus* (Jones 1983) and *A. vernalis* (Correll & Johnston 1970), found primarily from Texas through Arkansas and into Missouri. There appears to be significant intergradation between the typical and the narrow leaved forms, however, and Cronquist (1980) recognized *A. poaceus* only as a synonym of *A. azureus*, without distinctive biological or taxonomic status. The lower leaves of the Coahuilan plants show the same array of shapes as

observed by Shinners (1941, p. 408) in the same species in Wisconsin: the blades "vary from deeply cordate at base to merely truncate, or sometimes all but the lowest are tapered to the petiole."

The disjunction between east Texas and northern Coahuila in *Aster oolentangiensis* probably represents a specialized case of the more common pattern found in *A. drummondii* (below), where northern Coahuilan plants also occur on the Edwards Plateau of Texas, from where they may or may not extend further north and east. The particularly wide separation of the southern populations of *A. oolentangiensis* is unusual, however, and I have not encountered similar examples.

3. *Aster drummondii* Lindl. *in* Hook., Companion Bot. Mag. 1:97. 1835.

Aster texanus Burgess *in* Small, *Fl. Southeast. U.S.* 1214. 1903. *Aster drummondii* Lindl. subsp. *texanus* (Burgess) A.G. Jones, Phytologia 55:380. 1984. *Aster drummondii* Lindl. var. *texanus* (Burgess) A.G. Jones, Phytologia 63:131. 1987.

Aster coahuilensis S.F. Blake, J. Washington Acad. Sci. 27:377. 1937. TYPE: MEXICO. Coahuila: Mpio. Muzquiz, moist wooded canyon on the E slope of the Sierra de San Manuel; 30 Jun 1936, *F.L. Wynd & C.H. Mueller 372* (HOLOTYPE: US!).

Aster drummondii is common on the Edwards Plateau of Texas, with an intervening distance of more than 300 kilometers between those populations and the single known locality in México (Map 3). Both the Texan and Mexican plants represent the segment of the species known as var. *texanus*, which occurs from Texas and Louisiana to Kansas and western Kentucky. Var. *texanus* is distinguished by its finely strigillose achenes (vs. glabrous in var. *drummondii*). In slightly different and intergrading forms, the species continues northward to Minnesota (see Jones 1984). Most collections of *A. drummondii* are tetraploid, with diploids relatively rarely known from populations of var. *drummondii* (Jones 1980).

The Mexican plant collected by Wynd & Mueller (*Aster coahuilensis*) was noted by Blake in the original description as resembling *Aster laevis* in its inflorescence, and a recent annotation (1990) by Almut Jones has noted that the plant is perhaps influenced by genes of *A. laevis*. There are plants of *A. drummondii*, however, on the Edwards Plateau of Texas that are a close match for the Mexican collection, and I find no compelling evidence to call a hypothesis of hybridization to account for the variation. As noted above, *A. laevis* does not even occur in Texas, except for the rare plants in the Guadalupe Mountains, where *A. drummondii* is not found.

The floristic relationship between northern Coahuila and the Edwards Plateau is strongly established by evidence from numerous other species of

Maps 2 and 3. 2 (above). Distribution of *Aster oolentangiensis* in Texas and México; the range continues northward and eastward. 3 (below). Distribution of *Aster drummondii* in Texas and México; the range continues northward and eastward.

various families that show a similar pattern of distribution, as demonstrated by the examples below. The Edwards Plateau is primarily a limestone based region, dissected by a number of drainages and characterized mostly by open, juniper-scrub oak woodlands. Relatively similar areas in northern Coahuila are separated by the Rio Grande plains. In the following, the plants occur most abundantly in Texas, the Coahuilan populations rare or relatively so: *Grindelia lanceolata* Nutt. var. *texana* (Scheele) Steyerm., *Grindelia grandiflora* Hook., *Prunus mexicana* S. Wats., *Sisyrinchium dimorphum* Oliver, *Solidago petiolaris* Ait., *Taxodium distichum* (L.) Rich., *Stenostiphon filifolium* (Nutt.) Heynh., *Triodanis coloradoensis* (Buckl.) McVaugh, *Physostegia correllii* (Lundell) Shinners, *Physostegia praemorsa* Shinners, and *Lythrum ovalifolium* Engelm. *ex* Koehne. *Viburnum rufidulum* Rafin. is common in the eastern United States, rare on the Edward's Plateau, then disjunct to northern Coahuila as well as one area in trans-Pecos Texas. Several species show the same pattern of distribution but apparently have their primary range in Mexico, from there disjunct northward to the Edwards Plateau: *Chamaesaracha edwardsiana* Averett is most abundant in Coahuila and west central Nuevo León, uncommon on the Edwards Plateau; and *Erigeron mimegletes* Shinners also is relatively common in some areas of north central México but rare on the Edwards Plateau.

ACKNOWLEDGMENTS

I thank B.L. Turner and Luc Brouillet for their review of the manuscript, the staffs of NY and US for loans of specimens, and David Riskind for making his specimens from the Serranias del Burro available. A set of these Riskind duplicates has been deposited at ANSM (Saltillo), a second set at MEXU (Cd. México). Barney Lipscomb (BRIT/SMU) added data on the distribution within Texas of *Aster drummondii* and *A. oolentangiensis*, and I am grateful to him for this as well as his continual help on other projects. All other distributional data is from LL,TEX.

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